REMARKS

In the Office Action, claims 1-18 were allowed, claims 19-22 were rejected, and claims 23-28 were canceled. All pending claims are believed to be clearly allowable. Reconsideration and allowance of all pending claims are requested.

Rejections Under 35 U.S.C. § 103(a)

Independent claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Busse et al. (U.S. Patent 5,359,760, hereinafter "Busse") in view of Gururaja (U.S. Patent 6,868,594, hereinafter "Gururaja"). Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. Applicants respectfully assert that the present invention, as recited in independent claim 19 is patentable over Busse.

Claim 19 and claims depending therefrom:

Claim 19 is clearly distinguishable from the teachings of Busse and Gururaja, alone or in combination. In particular, neither Busse nor Gururaja teaches, discloses or suggests at least "laminating the metallized plates together *with confronting metallized surfaces* to form a block", as recited in claim 19.

In particular, in describing this feature in the Application, Applicants disclose, with reference to FIG. 1 and FIG. 2, that piezoelectric ceramic material is sandwiched between a pair of metal layers, and the metallized ceramic layer thus formed is diced to produce bars. These bars are rotated 90 degrees such that the metallic layers are adjacent to each other. The stack of bars is then laminated to form a block. In other words, the bars are laminated together to form a block, such that the metallized surfaces of the bars confront each other. For example, the recitation provides:

> Referring to FIG. 1, the first step in the method of manufacture is to form or cut a plate-shaped parallelepiped of piezoelectric ceramic material 2. Respective layers of metal 4 and 6 are then deposited on the mutually parallel, large-area faces of the piezoelectric ceramic layer 2. The metal thickness is commonly less than 5 microns, and most commonly less than 2 microns. This metallized plate is then diced along a multiplicity of mutually parallel cut planes 8 (indicated by dashed lines in FIG. 1) that are perpendicular to the metallized faces of the ceramic layer. This dicing operation produces a multiplicity of substantially identical bars, metallized on two faces on opposite sides.
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> In the next stage of manufacture, the bars are rotated 90 degrees and arranged in a stack (the stack is on its side in FIG. 2), with the metal layers of adjacent bars mutually confronting, and then the bars are laminated to form a solid plate of material, as seen in FIG. 2.
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> See Application (in its published form, US 2005/0099097 A1), paragraph 0025, and paragraph 0026, first sentence.

In contrast, as noted by the Examiner, Busse does not teach forming layers of metal on the surfaces of both sides of the ceramic PZT plates.

Gururaja, teaches a method of forming a composite transducer element. According to the reference:

> FIGS. 9A-9G illustrate one method of forming a composite element 230. Wafers 235 of PZT material are electroplated (or electrodes applied by other means) on their opposing major surfaces 236 and 237 (see FIG. 9 A). Each wafer may be 50 microns thick, for example. The wafers 235 are polarized (i.e., poled) along the thickness t so that the PZT exhibits piezoelectric properties. The electroded wafers are then stacked with spacers 261 at lower edge 260, thus separating the major surfaces 236 and 237 of adjacent wafers (see FIG. 9 B). Each spacer 261 may be 25 microns thick, for example. The number of wafers that are stacked depends upon the application, but the stack 262 may include tens or hundreds of such wafers, if necessary. The entire stack 262 is then cast in an epoxy matrix, forming polymer layers 238 which fill the spaces between the ceramic wafers 235 (see FIG. 9 C). A bottom portion 264 of the stack which includes the spacers is trimmed away by a diamond saw blade, as shown in FIG. 9 D. The polymer filled stack 263

> is then cut into transverse sections of transducer elements 230 (FIG. 9E) of the appropriate size. Gururaja, column 7, lines 23-42.

Thus, Gururaja, teaches forming the composite transducer element by stacking electroplated PZT wafers with spacers, so that there exists a gap between each of the stacked electroplated PZT layers. The gaps or spaces are then filled with polymer material. Therefore, the metallic surfaces of the electroplated PZT wafers do not confront each other. In other words, the metallized plates are *not laminated together with confronting metallized surfaces*.

Furthermore, neither Busse nor Gururaja teaches, discloses or suggests at least "cutting the block along parallel planes perpendicular to the metal layers to form a multiplicity of stacks, each stack comprising *alternating ceramic layers and electrodes* with metal edges of the electrodes exposed on the periphery of each stack", as recited in claim 19. As discussed above, the invention as recited in claim 19, has a ceramic layer and the electrodes (metallic layers) that confront each other. The claim also requires alternating ceramic layers and electrodes (metallic layers).

In stark contrast, Busse teaches a completely different structure. Specifically, Busse teaches that the PZT plates are interposed with polymer layers. According to the reference:

> At the step shown by FIGS. 1(d) and 2(d), the sintered PZT plates 30 are assembled in a stack 34, the PZT plates 30 being interposed with layers 32 of a thermoplastic polymer, such as polyvinyl butyral (PVB) or polyvinyl formal (PVF). Busse, column 5, lines 61-65.

Similarly, Gururaja teaches that the stacks are cast in an epoxy matrix, forming polymer layers that fill the spaces between the ceramic wafers. Therefore, there are no *alternating ceramic layers and electrodes* in Gururaja's resulting structure.

Thus, neither Busse nor Gururaja specifically teach, disclose, suggest, or show a motivation to form elements having metallized ceramic layers having *confronting metallized surfaces*. Moreover, neither Busse nor Gururaja specifically teach, disclose, suggest, or show a motivation to form elements having *alternating ceramic layers and electrodes*. Thus, it is respectfully requested that the rejection of Claim 19 and its dependent claims under 35 U.S.C. §103(a) be withdrawn.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this Application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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